2005 Idaho Conditions Report

Bark Beetles:

Mountain Pine Beetle

Mountain pine beetle (MPB) continues to be the most frequently encountered and damaging bark beetle in the state. This beetle attacks and kills all locally occurring pine species. MPB-caused pine mortality decreased statewide from last year's estimate, with 1, 508,753 trees killed over 513,328 acres. However, several forests reported increased mortality in lodgepole pine.

MPB-caused trees mortality continues to be high in certain parts of Idaho due to continued environmental conditions favorable to beetle infestations. For the third consecutive year, most of the mortality occurred in lodgepole pine in southern Idaho on the Salmon-Challis and Sawtooth National Forests including the Sawtooth National Recreation Area.

MPB-caused whitebark pine mortality decreased in 2005, to approximately 110,150 trees killed over 49,160 acres. The largest outbreak continues on the Salmon-Challis and Sawtooth National Forests including the Sawtooth National Recreation Area.

Southern Idaho: In 2005, increased mortality occurred in lodgepole pine on the Payette, Caribou-Targhee, and Boise National Forests as well as Bureau of Indian Affairs lands. Declining mortality was reported on the Sawtooth and Salmon-Challis National Forests and Bureau of Land Management, State, and private lands. In the Stanley Valley on the Sawtooth National Forest the outbreak is subsiding due to lack of host species. Another indicator that the outbreak is subsiding is the increase in the Pityogenes knechteli attacking and killing lodgepole pine in scattered areas. P. knechteli normally breed in small-diameter slash or thin-bark portions of the boles of trees killed by MPB. When populations are increased they spill over into green trees, killing smaller diameter lodgepole pine.

Mountain pine beetle also caused mortality in whitebark/limber pine stands in southern Idaho. Bureau of Land Management, State, and private lands experienced a slight increase in mortality. All of the National Forests in southern Idaho reported decreased mortality.

		MPB (white pine) Estimated Mortality			**MPB** (ponderosa pine) Estimated Mortality			**MPB** (lodgepole pine) Estimated mortality			**MPB** (whitebark/limber pine) Estimated Mortality		
Area	**Year**	**Acres**	**Trees**	**Volume MBF**	**Acres**	**Trees**	**Volume MBF**	**Acres**	**Trees**	**Volume MBF**	**Acres**	**Trees**	**Volume MBF**
Bitterroot	2004 2005	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**0**	**0**	**0.0**
Boise	2004 2005	**0** **0**	**0** **0**	**0.0** **0.0**	**0** **0**	**0** **0**	**0.0** **0.0**	**5,723** **8,624**	**12,305** **25,758**	**196.9** **412.1**	**2,024** **833**	**5,617** **3,066**	**112.3** **61.3**
Clearwater	2004 2005	**718**	**267**	**106.4**	**822**	**416**	**33.3**	**5,823**	**11,481**	**994.1**	**2**	**1**	**0.1**
Coeur d'Alene	2004 2005	**453**	**812**	**211.6**	**0**	**0**	**0.0**	**3,581**	**16,063**	**1,158.8**	**13**	**110**	**12.1**
Kaniksu	2004 2005	**597**	**241**	**68.0**	**461**	**430**	**33.5**	**27,660**	**90,028**	**7,937.8**	**8,132**	**32,722**	**3,598.8**
Kootenai	2004 2005	**7**	**12**	**5.0**	**0**	**0**	**0.0**	**0**	**0**	**0.0**	**0**	**0**	**0.0**
Nez Perce	2004 2005	**17**	**0**	**8.4**	**1,503**	**3,029**	**131.8**	**159,206**	**463,677**	**39,532.7**	**17**	**21**	**2.3**
Payette	2004 2005	**0** **0**	**0** **0**	**0.0** **0.0**	**0** **0**	**0** **0**	**0.0** **0.0**	**2,613** **5,928**	**4,604** **17,431**	**73.7** **278.9**	**908** **454**	**1,340** **697**	**26.8** **13.9**
Salmon-Challis	2004 2005	**0** **0**	**0** **0**	**0.0** **0.0**	**0** **0**	**0** **0**	**0.0** **0.0**	**123,577** **125,934**	**529,626** **423,819**	**8,474.0** **6,781.1**	**29,831** **20,385**	**70,610** **47,876**	**1,412.2** **957.5**
Sawtooth	2004 2005	**0** **0**	**0** **0**	**0.0** **0.0**	**0** **0**	**0** **0**	**0.0** **0.0**	**128,662** **84,331**	**584,241** **366,348**	**9,347.9** **5,861.6**	**19,576** **15,267**	**42,227** **25,599**	**844.5** **512.0**
St. Joe	2004 2005	**548**	**722**	**36.0**	**119**	**122**	**7.4**	**7,868**	**17,997**	**1,572.1**	**9**	**20**	**1.5**
Caribou-Targhee	2004 2005	**0** **0**	**0** **0**	**0.0** **0.0**	**0** **0**	**0** **0**	**0.0** **0.0**	**7,803** **12,428**	**17,825** **35,783**	**356.5** **715.7**	**3,417** **1,986**	**8,547** **3,898**	**170.9** **78.0**
Indian Res.	2004 2005	**0** **0**	**0** **0**	**0.0** **0.0**	**25** **0**	**18** **0**	**0.0** **0.0**	**3,427** **222**	**5,408** **370**	**86.5** **6.0**	**0**	**0**	**0.0**
BLM	2004 2005	**37** **0**	**55** **0**	**0.9** **0.0**	**29** **0**	**86** **0**	**4.3** **0.0**	**2,916** **1,507**	**11,076** **3,494**	**177.2** **55.9**	**963** **1,338**	**2,365** **5,777**	**47.3** **115.5**
Other Lands	2004 2005	**536** **0**	**732** **0**	**153.7** **0.0**	**639** **14**	**1,352** **30**	**67.6** **0.6**	**4,321** **2,631**	**9,413** **6,697**	**150.6** **107.2**	**180** **335**	**397** **645**	**7.9** **12.9**
IdahoTotals	2004 2005	**2,913**	**2,841**	**590.0**	**3,573**	**5,435**	**277.9**	**483,180**	**1,773,744**	**69,973.3**	**65,072**	**163,977**	**6,236.7**

David- This table does not reflect R1 data for 2005. You will need to add that in and correct the volumes. We use a multiplier of .016 for lodgepole & .02 for whitebark in R4. Also double check the 2004 numbers as I took them from the draft copy and they are not all correct.

Pine Engraver

Pine engraver beetle-caused mortality dropped significantly with 518 trees killed over 167 acres statewide compared to 4,203 trees killed over 1,198 acres in 2004. Most of the mortality occurred in northern Idaho.

Southern Idaho: The number of ponderosa pine trees affected by Ips pine engraver reduced by more than half from 2004's reported 353 trees killed over 176 acres to 118 trees killed over 59 acres in 2005.

Western Pine Beetle

In 2005, ponderosa pine tree mortality caused by the western pine beetle decreased across the state. Approximately 4,600 trees were killed across 2,700 acres compared to 19,950 trees killed across 15,800 acres reported in 2004. Nearly all of the pine mortality attributed to the western pine beetle occurred on the west side of Idaho or in the Idaho Panhandle.

Southern Idaho: Ponderosa pine mortality attributed to the western pine beetle decreased significantly from 2004. Approximately 1,500 trees were killed across nearly 800 acres – down from 2004's reported 6,500 trees killed across 5,350 acres. Nearly all of the ponderosa pine mortality attributed to the western pine beetle occurred in scattered pockets on the western portion of the Boise and Payette National Forests or on private lands adjoining them.

Spruce Beetle

In 2005, spruce beetle-caused tree mortality decreased to endemic levels across Idaho. In 2005, approximately 400 spruce trees were killed across 550 acres compared to 1,300 trees killed over 1,175 acres. Most of the mortality occurred in Northern Idaho for 2005.

Southern Idaho: In 2005, no notable spruce beetle caused mortality was reported in southern Idaho. In 2004, 1,225 trees were reported killed across 1175 acres; mostly on the Caribou-Targhee National Forest. No spruce beetle-caused mortality was reported on the Caribou-Targhee National Forest in 2005.

Douglas-fir Beetle

Douglas-fir beetle-caused mortality decreased in 2005, with 89,475 trees killed over 47,125 acres compared to 206,450 trees killed over 111,650 acres in 2004.

Southern Idaho: While the number of Douglas-fir trees killed by Douglas-fir beetle in 2005 has reduced, Douglas-fir mortality was reported on all flown ownerships from federal to private lands wherever host type was found. Most of the mortality occurred on the Salmon-Challis National Forest (26,788 trees over 12,348 acres) with the North Fork Ranger District most affected--12,000 trees killed over 5,800 acres. Caribou-Targhee National Forest with 24,788 trees killed over 12,183 acres had the second highest reported numbers. Douglas-fir mortality remains high on the Sawtooth National Forest especially Ketchum Ranger District (8,754 trees killed over 5,354 acres) and Sawtooth National Recreation Area (6,344 trees killed over 3,316 acres).

Western Balsam Bark Beetle / Subalpine Fir Complex

Subalpine fir mortality caused by western balsam bark beetle/subalpine fir complex decreased by half in 2005 to 118,750 trees killed across 86,575 acres from 236,175 trees killed over 139,875 acres in 2004.

Southern Idaho: Subalpine fir mortality decreased by a third from 2004's reported figures of 168,175 trees killed over 105,700 acres to 118,750 trees killed over 86,575 acres in 2005. The Salmon-Challis National Forest had the highest amount of mortality for the third consecutive year—27,174 trees across 10,715 acres with most of the mortality occurring on the Leadore and Lost River Ranger Districts. The Sawtooth National Forest also reported high mortality rates with 20,890 trees killed across 8,154 acres; most mortality occurred in the SNRA and Minidoka Ranger District.

Fir Engraver Beetle
Fir engraver beetle-caused mortality dropped significantly in 2005. A reported 88,800 trees were killed across 57,800 acres statewide compared to 233,925 trees killed across 279,000 acres in 2004. Most of the mortality occurred in northern Idaho where large areas of scattered mortality occurred.

Southern Idaho:
Fir engraver beetle-caused mortality has nearly returned to endemic levels. In 2005, 1,806 trees were killed across 977 acres compared to 39,800 trees killed over 34,725 acres in 2004. Most of the mortality occurred on the west side of Idaho from the Seven Devils Recreation Area to Banks. Ownerships most affected were private lands (561 trees, 291 acres), Payette (462 trees, 211 acres) and Boise (449 trees, 209 acres) National Forests.

Defoliators:

Western Spruce Budworm

Southern Idaho: Budworm-caused defoliation of subalpine and Douglas-fir increased substantially from nearly 13,000 acres in 2004 to over 63,200 acres in 2005. Although most ownerships were affected by budworm defoliation, most was reported on the Boise National Forest with 53,718 acres defoliated affecting all districts.

Douglas-fir Tussock Moth

Southern Idaho: Douglas-fir Tussock Moth (DFTM) defoliation affected nearly 3,800 acres. All defoliation occurred on the Albion and Deep Creek Mountains and Pleasantview Hills south and west of Pocatello.

Balsam Woolly Adelgid
Hosts: Grand fir, subalpine fir

Balsam woolly adelgid (BWA), a non-native invasive insect from Europe, was first detected in Idaho in 1983 near Coeur d'Alene. BWA is capable of killing fir trees in ornamental, forest, and Christmas tree plantation settings. It is easily identified by the presence of masses of white "woolly" females on bark of stems and branches of true fir. The host range includes native grand fir and subalpine fir, along with white fir planted in landscape settings. Since establishment, the traditional host range of BWA in Idaho had been restricted to, roughly, a 250-mile band in northern Idaho between the Salmon and St. Joe Rivers. However, during 2001 BWA killed four subalpine fir trees in residential areas of Cascade and McCall, Idaho.

Northern Idaho: Aerial detection estimated 28,000 acres infested by the balsam woolly adelgid (BWA) in northern Idaho in 2005. This is lower than the estimated 50,000 acres

detected in 2004. The yearly fluctuation of acres infested by BWA is likely an artifact of aerial survey methodology and the visibility of BWA symptoms from year to year, and not to a decline in BWA population or distribution in the region. In actuality, the number of acres infested likely exceeds the recent "high" level of 85,000 acres mapped in 2002, as some infested areas may not yet be displaying crown symptoms. Areas with the heaviest infestations occurred on the St. Joe, Clearwater, and Nez Perce National Forests, along with adjacent state, private, and BLM lands in Idaho, Clearwater, Latah, Benewah, and southern Shoshone counties. Subalpine fir mortality occurred in all ages and size classes. Extensive gouting and bole infestations occur on grand fir, but to date no grand fir over 5 inches in diameter has been documented as being killed by BWA. Regeneration mortality of both subalpine and grand fir is high, resulting in forest type conversions in some areas.

Southern Idaho: South of the Salmon River, in Region 4, BWA is currently found in isolated cases on residential firs in McCall, Idaho extending as far south as Cascade Reservoir. Likely, BWA has spread to other nearby areas of the National Forest that are not easily accessible. Continued surveys to delimit the distribution of BWA and damage assessment surveys are planned in the near future for both northern and southern Idaho.

Aspen Leaf Blight

Southern Idaho: Marssonina leaf spot was evident on nearly all aspen stands on the Targhee National Forest in 2005 where most of the 4,630 acres were reported in 2005.

Needle Cast

The location and intensity of needle cast symptoms are difficult to discern and delimit from aerial surveys. Therefore, the 1,300 acres reported in 2005 do not adequately reflect the actual amount of needle cast that occurred in southern Idaho. Needle cast was prevalent in lodgepole pine throughout southern Idaho. It was also observed in understory larch and Douglas-fir. Occurrences appeared to be heaviest in the Boise, Payette, and Sawtooth National Forests and other adjacent ownerships.

Gypsy Moth Detection Trapping

During the summer of 2005 the Boise office of USDA Forest Service, Forest Health Protection participated in a cooperative* effort to monitor for introduction of gypsy moth into the state of Idaho.

We placed and retrieved approximately 400 gypsy moth detection traps in major cities and towns of south central and eastern Idaho. We also placed traps in some 20 USDA Forest Service campgrounds around the same regions of the state.

No gypsy moths were captured.

(*Partners include: Idaho Department of Lands, Idaho Department of Agriculture and USDA – APHIS Plant Protection & Quarantine)

STEM AND BRANCH DISEASES

Comandra blister rust

This disease occurs infrequently on lodgepole and ponderosa pine throughout Idaho. Localized areas of heavy infection resulting in branch, top and entire tree mortality of sapling-size ponderosa pine occurs in offsite plantations in southern Idaho.

Dutch elm disease

In Idaho this disease has become common in many communities along the Snake River in southern Idaho, after initial discovery in Boise in 1975 where the disease is still active. Seven trees were diagnosed with the disease and removed in 2005, reducing the population of street-tree elms to around 1,000 from a high of 6,000 30-years previous. Unfortunately Dutch elm disease is slowly working its way into northern Idaho communities. It was discovered in Moscow in 1990, but an aggressive treatment program has limited losses to only a few trees per year for the past several years. It has also been discovered in several Inland Empire communities nearby--Genesee, in Idaho; Palouse and Pullman, in Washington.

Pinyon blister rust

This disease occurs on pinyon pine in the Raft River Mountains on the Sawtooth NF in central Idaho. Disease levels are generally sporadic and tree mortality is very low.

Stalactiform rust

This rust disease occurs on lodgepole pine in localized areas throughout southern Idaho. Severe infection has occurred in localized stands on the Boise, Payette, Sawtooth and Targhee NF's.

Western gall rust

This disease occurs throughout the range of lodgepole and ponderosa pine in Idaho. Disease levels vary from year to year and some sites are more prone to damage from this disease than others. Genetic resistance varies widely and resistant individuals can often be found in locations with high infection levels. Generally the disease is not an important cause of mortality, although branch and stem breakage can be of concern, especially within recreation areas. Gall rust is an important consideration in tree improvement plantations where infection can significantly affect performance of young trees. It has also been found damaging ornamental pines including Scots, Austrian, and mugho.

White pine blister rust

White pine blister rust was introduced into western North America around 1910, and subsequently spread to western white pine, whitebark pine, and limber pine in Idaho and other western forests. This disease, along with bark beetles, fire suppression, and harvesting reduced white pine dominated stands to less than 5% of the 5 million acres where it once was the dominant species.

Residual mature white pine continues to be lost due to a combination of blister rust and mountain pine beetle, and blister rust may also kill a high proportion of naturally regenerated seedlings. This has resulted in major changes in historical transitions in forest types over broad areas. Western white pine has historically been the dominant species in moist habitat types of northern Idaho, but has been replaced by species such as grand fir, Douglas-fir, and hemlock. These tree species are more susceptible to native disturbances such as bark beetles and root diseases. Efforts to restore white pine are concentrating on planting stock with improved natural resistance. Improved stock has been planted since the mid 1970's and current monitoring efforts are focused on gaining a better understanding of variation in infection levels observed in improved stock performance over time. In addition, lower branch pruning of younger trees is being conducted on a large scale in certain areas to improve survival rates.

White pine blister rust is also causing extensive mortality in high-elevation five-needle pines. Recent surveys of high-elevation forests have found infection rates in whitebark pine regeneration of up to 90%. Infection levels in mature whitebark are also high, but are extremely difficult to determine accurately. There is a growing concern that severe losses of large diameter whitebark pine due to increasing mountain pine beetle populations coupled with regeneration losses due to blister rust may have significant impacts on the hydrologic functions and wildlife in these fragile ecosystems.

CANKER DISEASES

Atropellis canker

This disease is usually found on the boles of pole-sized lodgepole pine where it primarily causes stem defects and topkill; tree mortality is infrequent. It is also occasionally found killing small branches of western white pine and whitebark pine. The disease is uncommon, but can be found sporadically across the entire state.

Cytospora canker

This disease has been found throughout the state on all *Abies* spp. Infected trees display branch flagging, top killing, and infrequent mortality. The disease is associated with environmental stresses such as drought, frost, and freezing damage. Severely-infected subalpine fir may be killed by the western balsam bark beetle.

Sphaeropsis blight

This disease is very common on ponderosa pine in many areas of northern Idaho, but has never been documented in the southern part of the state. Damage occurs primarily as a branch or main stem dieback. Affected trees are often found in riparian areas, although damage can occur on the edges of any ponderosa pine stand. Apparently, disease severity is cyclic and associated with years of prolonged cool, wet weather. This disease does not normally cause tree mortality (except in nursery seedlings), but results in trees with dieback symptoms that may be especially unsightly in recreational and residential areas.

STEM DECAYS

Aspen trunk rot

Decay caused by this fungus occurs most frequently in aspen stands greater than 60-years old in southern Idaho.

Rust Red stringy rot (Indian Paint fungus)

This fungus is an important cause of heartwood decay of hemlock and *Abies* spp. It causes more than 90% of the decay occurring in these species and is especially damaging in trees older than 60 years. The most extensive damage is usually found in stands with multiple entries. It occurs most frequently in northern Idaho stands growing in cool, wet conditions, while the most damage in southern Idaho occurs in mature and overmature stands of *Abies* spp. in much drier climates.

Red ring rot (White pocket rot)

This fungus causes white pocket decay of heartwood in western larch and all pine species. It occurs less frequently on spruce, Douglas-fir and *Abies* spp. Damage levels vary considerably throughout Idaho. Mature trees with advanced decay are often used by cavity nesting birds and mammals.

ROOT DISEASES

Douglas-fir and Abies spp. are the primary hosts of root diseases. These species have increased dramatically during the past several decades due to the loss of western white pine, western larch and ponderosa pine from blister rust, fire control, harvesting, and forest practices such as thinning that favor shade tolerant species. As a result, root diseases have become the most important diseases in northern Idaho. The most important root pathogens are Phellinus weirii (cause of laminated root disease) and *Armillaria ostoyae* (cause of Armillaria root disease). Many root pathogens are intimately associated with insects (particularly bark beetles) either as vectors or agents that attack and often kill infected trees. Therefore, mortality levels may vary from year to year in response to bark beetle activity.

Annosum root disease

Annosum root disease is separated into two types based on the hosts attacked. Infected trees are frequently found near stumps, which serve as inoculum sources. Importance, distribution, and impact of this root disease vary widely throughout Idaho. Most damage is concentrated in lower elevations where ponderosa pine is the dominant tree species and past harvesting of large trees has been common. Presence of annosum root disease in ponderosa pine stands greatly decreases the potential for managing ponderosa pine. These sites are usually too dry to effectively grow alternative tree species, so preventing the introduction and subsequent increase of annosum root disease is crucial for managing ponderosa pine. The “s-type” of Annosum root disease is widespread at low levels on Douglas-fir and true firs in mixed conifer stands throughout western Montana and northern Idaho. It is frequently found in association with other root diseases. The “p-type” attacks pines and is common in ponderosa pine stands in southwestern Idaho.

Armillaria root disease

In northern Idaho this pathogen is the most broadly distributed of the root pathogens and the most important disease agent, overall. It frequently occurs in conjunction with annosum root disease, laminated root rot, or brown cubical root and butt rot. Conifers of all species can be killed by *Armillaria* when they are young, but only Douglas-fir, subalpine fir and grand fir remain highly susceptible throughout their lives. Consequently, the damage is much greater in the latter species where severe disease often turns formerly forested sites into shrub fields for many decades.

Black stain root disease

Black stain root disease is found infrequently in Idaho. The pathogen may cause pinyon pine mortality (associated with insect attacks) in southern Idaho and occurs on off-site ponderosa pine in some stands in northern Idaho. The fungus is vectored by root-feeding insects, and infected trees are usually attacked and killed by bark beetles.

Brown butt rot

Phaeolus schweinitzii causes brown-cubical decay of roots and butts of Douglas-fir and pine species (particularly ponderosa pine). This fungus is a common root inhabitant of Douglas-fir trees of all ages, but causes root decay mostly in mature trees. Trees on poor sites (shallow soils with poor water-holding capacity) are especially prone to damage by this fungus. Infected trees are rarely directly killed by this fungus, but may be predisposed to windthrow, other root diseases, and bark beetle attacks.

Laminated root rot

This root pathogen is a major cause of mortality of Douglas-fir and *Abies* spp. in northern Idaho only. Losses in some areas are extensive, although distribution of the pathogen within forests varies widely. Some level of disease-associated mortality occurs each year with greater mortality occurring during years of drought stress or high bark beetle populations. This disease is most severe on sites that historically may have supported mostly western white pine and western larch. These tree species have been replaced by highly susceptible Douglas-fir, grand fir, and subalpine fir with consequent increases in this pathogen. It causes damage to trees of all ages, primarily in distinct groups or pockets. This pathogen is often found in conjunction with *Armillaria* and/or annosum root diseases.

Tomentosus root rot

This disease occurs on Douglas-fir, subalpine fir, Engelmann spruce and lodgepole pine. The pathogen usually causes root and butt decay, often in association with other root-infecting fungi. Infected pole-sized or larger trees may have increased susceptibility to bark beetle attack and windthrow. The pathogen is most common in mature to overmature stands in southern Idaho, but occurs at low levels throughout the state.

White mottled rot

This root pathogen of aspen is increasing throughout overmature aspen stands in southern Idaho. The disease is easily observed on windthrown trees on the Caribou and Sawtooth NF's.

DWARF MISTLETOES

Dwarf mistletoes are parasitic seed plants in the genus *Arceuthobium.* They occur on most conifer species in Idaho, especially Douglas-fir, western larch, ponderosa and lodgepole pine. Western larch overstory trees throughout many stands in northern Idaho are extensively infected with dwarf

mistletoe. Douglas-fir and ponderosa pine are infected only in particular stands in northern Idaho. Lodgepole pine dwarf mistletoe is widely distributed throughout the type. Suppression projects have continued to remove infected overstory trees. However, dwarf mistletoes remain very widespread and are probably are the most damaging disease in southern Idaho (See Table X).

Table X. Incidence of four dwarf mistletoe species in Idaho by host type

National Forest	Lodgepole Pine	Ponderosa Pine	Douglas-fir	Western Larch
Boise	40	20	30	10
Caribou	52	~	21	~
Clearwater	9	*	1	55
Idaho Panhandle	10	*	10	55
Nez Perce	40	*	55	50
Payette	40	28	30	21
Salmon	49	0	45	~
Sawtooth	70	0	53	~
Targhee	60	|~	40	~

* = insufficient survey data available; ~ = host species not found on this National Forest.

Lodgepole pine dwarf mistletoe is especially damaging in southern Idaho, and infests approximately 2 million acres (28 percent) of the lodgepole pine type. In northern Idaho it causes about 18 million cubic feet of growth reduction annually. Douglas-fir dwarf mistletoe infests about 600,000-acres (13 percent) of Douglas-fir forests, reducing growth by approximately 13 million cubic feet annually. Western larch dwarf mistletoe occurs on about 800,000--acres (38 percent) of western larch stands, and reduces annual growth by over 15 million cubic feet. Ponderosa pine dwarf mistletoe is prevalent throughout its host range in southwestern Idaho. In northern Idaho the disease is locally heavy in ponderosa pine stands around Coeur d'Alene and along the Spokane River drainage in northern Idaho. In southern Idaho, limber pine dwarf mistletoe infects much of the host type within Craters of the Moon National Monument.

FOLIAGE DISEASES

All conifer species are susceptible to foliage diseases but damage varies from year to year. Foliage diseases are usually favored by high moisture conditions, so damage is typically most severe in dense stands and in the lower portions of crowns. Infections generally occur during moist periods in the summer or fall, but damage may not be observed until needles are killed the following spring. Since most foliage diseases only attack one age class of needles, they very rarely cause tree mortality. However, several years of infection may result in reduced growth. The effects of foliage disease are most apparent and significant in Christmas tree and tree improvement

plantations where healthy foliage is required. In these cases, direct suppression with fungicides is often warranted.

Elytroderma needlecast

This foliage disease is sustained perennially within small witches' brooms on ponderosa pines, where it can perpetuate the disease year after year. Localized areas of chronic infection from Elytroderma are on the Boise, Clearwater, Payette, Nez Perce, and Salmon National Forests.

Lodgepole pine needlecast

Lophodermella concolor causes cyclic damage on lodgepole pine throughout Idaho. In southern Idaho, the disease appears following periods of drought. In northern Idaho, extensive damage is evident in the early spring in some stands. Damage varies from year to year and it is difficult to predict future disease levels based on observations of spring weather conditions. High levels of infection make trees appear extensively damaged and may be confused with bark beetle mortality. However, the disease usually has no prolonged effects on infected trees although growth may be temporarily reduced. An exception is in tree improvement plantations where growth reduction can seriously affect tree performance.

Rhabdocline needle cast

This disease is most apparent on sapling- to pole-sized Douglas-fir throughout Idaho following seasons of high moisture. It may cause extensive defoliation on dense young stands of Douglas-fir in the northern part of the state. Christmas tree production has been greatly reduced or eliminated in certain parts of northern Idaho because of this disease.

Swiss needle cast

This is another foliage disease of Douglas-fir that occurs throughout northern Idaho. In recent years, infection levels have increased, probably because of increasing fungal inoculum and favorable spring weather. Affected trees may have chlorotic thinning crowns as foliage is slowly killed and needle retention is reduced.

Larch needle diseases

Larch needlecast is caused by *Meria laricis* and needle blight is caused by *Hypodermella laricis*. Both diseases occur throughout the state and are generally cyclical, occurring at high levels during years of prolonged cool, moist weather in the spring and early summer.

Fir broom rust

This disease is widespread on *Abies spp*. throughout Idaho. Although the disease is usually of little consequence, high disease levels (greater than 50-brooms/tree) occur in some stands south in southern Idaho.

Spruce broom rust

This disease is scattered throughout spruce stands in Idaho. It appears most commonly in spruce stands in southeastern Idaho.

Cedar apple rust (Gymnosporangium rusts)

This disease periodically causes a leaf spot on residential apple trees and on *Amelanchier* spp. throughout the range of serviceberry in southeastern Idaho.

Miscellaneous foliage diseases
Marssonina blight and Shepard's Crook occurred at moderate levels of infection on aspen during 2005 in southern Idaho. Affected trees had brown-colored foliage from mid-July until leaf drop in the fall.

INTRODUCED DISEASES

Sudden Oak Death, also known as, Ramorum Canker Disease, or Ramorum Leaf Blight
This is a potentially dangerous non-native forest disease caused by a fungus, *Phytophthora ramorum.* Discovered in 2000 in coastal California, the disease now threatens natural oak woodlands, urban forests, and horticultural industries throughout the nation. It kills oaks and tanoaks in California and Oregon. It also causes stem and branch cankers, as well as leaf blight and twig dieback on many other species. To date over 60 tree, shrub, and herbaceous plant species are host to the fungus, including Douglas-fir, some true firs, and *Vaccinium spp.* It is easily transmitted on vegetative plant material. The Idaho State Departments of Agriculture, has responsibility to survey and monitor for the disease. After two years of monitoring efforts in nurseries, urban and forested areas the disease is still undetected within Idaho.

STATUS OF CHRONIC DISEASE PROBLEMS		
DISEASE	**HOST**	**LOCATION/REMARKS**
STEM & BRANCH DISEASES		
Aspen trunk rot	Aspen	Decay occurs in most aspen stands in southern Idaho and is increasingly common as stands age exceeds 60 years.
Atropellis canker	Lodgepole pine	Found in pockets in pole sized stands causing defect, topkill, and some mortality.
Comandra blister rust	Lodgepole pine/ponderosa pine	Infection occurs infrequently throughout Idaho. Heavy, localized areas of infection resulting in branch, top, and entire tree mortality of ponderosa pines occur in offsite plantations in southern Idaho.
Cytospora canker	True firs	Branch flagging, top killing, and mortality attributed to this fungus occurs wherever hosts are found. This disease is associated with environmental stress damage, drought, frost, and freezing. Western balsam bark beetles frequently kill the diseased trees.
Sphaeropsis blight	Ponderosa pine	Is causing widespread branch dieback in many Idaho areas; especially common in riparian areas.
Dwarf mistletoes	Douglas fir, western larch, lodgepole and ponderosa pine	Suppression projects continue to remove infected overstory trees; however, this forest disease remains the most widespread and damaging throughout the state.
Indian paint fungus	True firs, hemlock	Causes 90 percent of decay in these species throughout the state; especially common as age increases beyond 60 years. Common in mature and overmature stands of true firs throughout southern Idaho
Pinyon blister rust	Pinyon pine	This disease occurs in the Raft River Mountains on the Sawtooth National Forest
Red ring rot	Western larch, true firs, Douglas-fir, Western larch, true firs, Douglas pines, spruce	Can cause serious decay problems in mature conifers. Infection intensity varies throughout host stands in southern Idaho.
Stalactiform blister rust	Lodgepole pine	This rust occurs in localized areas throughout the host type. Heavy infection has been in very localized areas of the Boise, Payette, Sawtooth, and Targhee NF's.
Western gall rust	Lodgepole and ponderosa pine	Gall rust occurs throughout the host types. Infection levels vary, with localized heavy infection present in both host species.
White pine blister rust	Western white pine, limber pine, whitebark pine	This introduced disease is common throughout its host ranges in Idaho.
ROOT DISEASES		
Annosus root disease	Pines, true firs, Douglas-fir, spruce	Causes mortality, root and butt rot especially in young trees near old stumps; frequently in complexes with other root diseases; may predispose trees to windthrow and/or bark beetles. This root disease fungus can be found on pines throughout southern Idaho and on firs and spruce in northern Idaho.
Armillaria root disease	Douglas-fir, grand fir, other conifers especially when young and improperly planted	In northern Idaho, a widespread killer of all sizes of trees; In southern Idaho usually found as a weak pathogen or saprophyte causing little direct mortality or in complexes with other root diseases.
Black stain root disease	Pines, Douglas-fir	Found infrequently in Idaho; caused pinyon pine mortality in southern Idaho; usually in association with other root diseases.
Laminated root rot	Douglas-fir, true firs, occasionally other conifers	Primary killer in many stands from the Nez Perce NF north; may be found with Armillaria or other root diseases.
Schweinitizii root rot	Douglas-fir, pines	This decay is common in mature and overmature forests

		throughout the host type, especially those with a frequent fire or logging history. The fungus is often associated with other root pathogens and bark beetle activity.
Tomentosus root disease	Douglas-fir, subalpine fir, Engelmann spruce, lodgepole pine	Usually found as root/butt rot with other root diseases; occasionally causes mortality. It causes root and butt rot of pole sized and larger trees, predisposing them to bark beetle attack and windthrow. Most common in southern Idaho, but present throughout the state.
White mottled rot	Aspen	This pathogen is increasing in incidence throughout southern Idaho.
FOLIAGE DISEASES		
Cedar apple rust	Juniper, Apple, Serviceberry	In eastern Idaho, this disease caused a leaf spot on residential apple trees in Challis and to *Amelanchier* throughout the range of serviceberry in eastern Idaho.
Conifer-Aspen rust Conifer-Cottonwood rust	Aspen, cottonwood, conifers	Localized areas of infection
Rhabdocline needle casts	Douglas-fir	Widespread but relatively light levels statewide.
Swiss needlecast	Douglas-fir	Widespread in northern Idaho; generally at very low levels of infection.
Elytroderma needlecast	Ponderosa pine	Systemic and annual infections occur throughout the host type. Infection was especially noticeable in southern Idaho.
Fir broom rust	True firs	Widespread throughout the state; usually of little consequence, but is "extremely common" in stands south of the Snake River in southern Idaho.
Fir needlecast	Subalpine fir Grand fir	Infection occurred at low levels throughout the host type.
Fir needle rust	Subalpine fir	Scattered infection occurs on seedlings and sapling trees throughout the host type.
Larch needle disease	Larch	Incidence and severity of infection in west central Idaho is cyclical.
Lodgepole pine needlecast	Lodgepole pine	Infection intensity is worse following periods of drought. During intervening years, the disease is of minor localized importance.
Marssonina blight Shepard's crook	Aspen	Endemic in central and eastern Idaho. Affected trees had brown colored foliage from mid-July until leaf drop.
Pine needle rust	Pines	Scattered incidence of light to moderate intensity scattered throughout the host types in southern Idaho.
Spruce broom rust	Engelmann spruce	Scattered through host range; most common in eastern Idaho.
White pine needlecast	Western white pine	Static
NURSERY DISEASES		
Cylindrocarpon	Western white pine whitebark pine	Common in soil or contaminated containers, usually a saprophyte but may be a weak parasite, caused losses at several nurseries.
Diplodia tip blight	Pines	Low levels in areas with a history of problems.
Fusarium root disease	Douglas-fir, larch, spruce, others	The most common and widespread nursery disease; amount of damage varies widely.
Grey mold	most conifers, esp. larch, spruce	Common at low levels in many nurseries. Can be a serious problem during seedling storage.
Meria needlecast	Larch	Infection levels are low on bare root western larch.
Phoma blight	Pines	Commonly isolated from seedlings and soil samples.
Phytophthora/Pythium root rot		These fungi occur infrequently on seedlings and in soil at Lucky Peak Nursery in southern Idaho. Infection results in patch mortality and culling of 2-0 seedlings.
Sirococcus tip blight	Spruce, Pines	Found at average levels at several nurseries.

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